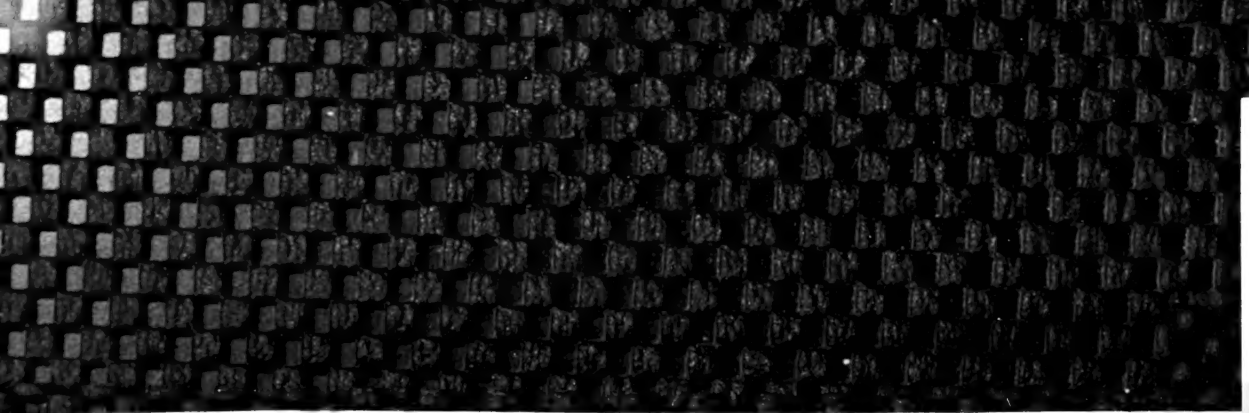


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ET-90

September 1936

United States Department of Agriculture  
Bureau of Entomology and Plant Quarantine

AN INEXPENSIVE HOT-WIRE GLASS CUTTER

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There is often need for a glass cutter in field laboratories where apparatus is being made from large glass tubing or from bottles and glass jars. The glass cutter herein described was made entirely from equipment usually found in the laboratory, or at least easily obtainable. The apparatus is more trouble-free than cutters made by using transformers, as the secondaries of the transformers usually available are not wound for such heavy work and will burn out at the end of a few weeks of service.

The sockets for the cells are connected parallel within the circuit, so that if more heat is desired at the hot wire the second coil may be added. This will decrease the resistance of the "coil unit" and thus provide more current at the hot wire (fig. 1). One 600-watt coil in the circuit will cut average-sized soft glass tubing, but with heavy glass it will be necessary to use the second coil.

The wooden base is first treated with linseed oil or oil paint to prevent warping of the finished unit. The switch sockets and ring stand are arranged in the manner shown in figure 2 and fastened to the board with brass screws.

It is necessary to bore 1/8-inch holes in the thin cast iron base of the ring stand. The asbestos board is mounted on the 3-inch ring with two bolts after 1/8-inch holes have been bored through the prongs of the ring. The binding posts are placed near the top corner of the asbestos board. The assembled unit is then wired according to the diagram (fig. 1). Nichrome wire (No. 20) is used for the hot wire. Twenty inches will accomodate 2½-liter bottles and all sizes of glass tubing.

The following procedure has been found satisfactory for operation. The cylindrical glass bottle or tubing is first scratched with a triangular file. The scratch is made with one stroke of the file and not by a sawing action. A short scratch is sufficient for all types of cutting. Sawing action of the file will shorten its life and gives a very poor cut. The switch is closed and the wire allowed to come to red heat. The bottle or tube is then placed in the loop, with the scratch at the bottom, and is then turned slowly, keeping the scratch on the hot wire. The crack will follow the heated portion, giving a clean cut.

For heat-resistant glass tubing the second coil is necessary. The tubing is scratched in the regular manner and is then placed in the loop and allowed to heat for 1 minute. The tube is then removed from the loop, and two drops of cold water are placed on the scratch from a pipette or medicine dropper. The tube will then crack along the heated section, giving a clean cut. After the apparatus has been used for a few times, improvement in the manipulator's technique will be noticed.

If it is desired to remove the sharp edge from the tubing or bottle after it has been cut, this may be accomplished by grinding with carborundum on a steel plate. The coarse carborundum is made into a dilute paste with water and placed on the steel plate. The cylindrical object is then ground on the plate with a circular motion. Where much grinding is being done it will be necessary to add new carborundum and water occasionally.

#### Material Needed

- 1 knife switch, single-pole, single-throw
- 2 porcelain cleat sockets
- 2 600-watt heating coils
- 2 binding posts
- 1 ring stand with 4- by 7-inch base
- 1 3-inch ring
- 1 clamp holder
- 5 feet of 20-ampere extension cord
- 6 feet of No. 12 rubber-coated interior electric wire
- 1 piece of  $\frac{1}{2}$ -inch compressed asbestos board, 3-1/4 by 5 inches
- 6 brass screws,  $\frac{1}{8}$  by 1 inch
- 2 brass machine bolts,  $\frac{1}{8}$  by 1 inch
- 40 inches of No. 20 Nichrome wire
- 1 piece of pine or fir,  $\frac{3}{4}$  by 10 by 11 inches, for base

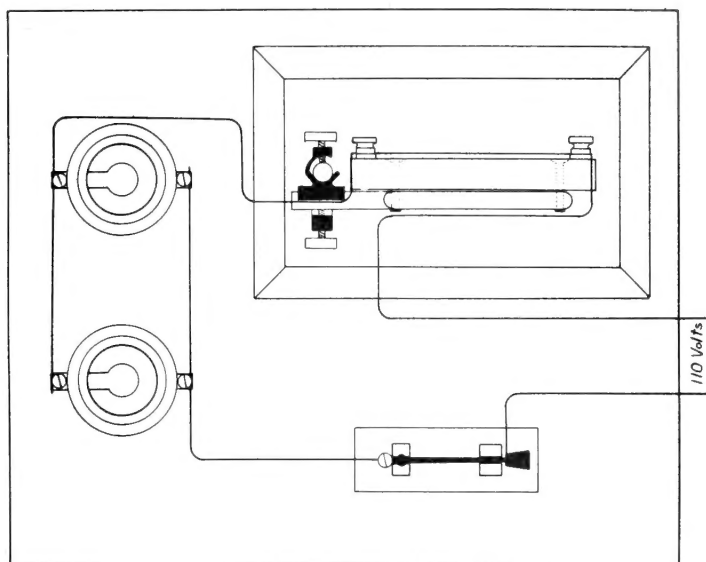


Figure 1.--Wiring diagram of hot-wire glass cutter.

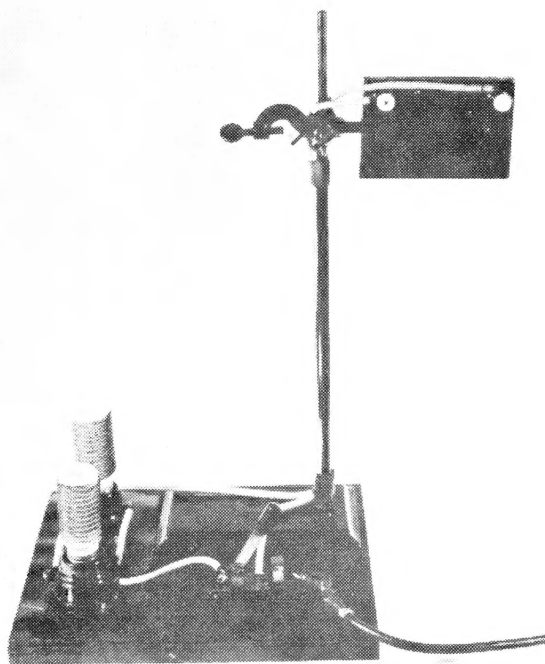


Figure 2.--Photograph of the hot-wire glass cutter, showing arrangement of integral parts.

